

# BARITE

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Barite, a name that was derived from the Greek word *barus* (heavy), is the mineralogical name for barium sulfate. In commerce, the mineral is sometimes referred to as barytes. As used in this report, the term primary barite refers to the first marketable product, which includes crude barite (run of mine) and the products of simple beneficiation methods, such as washing, jigging, heavy-media separation, tabling, flotation, and magnetic separation. Most crude barite requires some upgrading to minimum purity or density levels. Barite that is used as an aggregate in “heavy” cement or radiation shielding cement is crushed and screened to sizes ranging from 4 mesh (Tyler) (4.75 millimeter) to 1.5 inches (3.8 centimeters) for the coarse grade. Most barite is ground to a small uniform size before it is used as a filler or extender, an additive to industrial products, or a weighting agent in petroleum-well-drilling mud based on specifications set by the American Petroleum Institute (API) or the former Oil Companies’ Materials Association (OCMA).

Barite used for drilling petroleum wells can be black, blue, brown, buff, or gray depending on the ore body. It must be finely ground so that at least 97% of the material, by weight, can pass through a 200-mesh (Tyler) [75- micrometer ( $\mu\text{m}$ )] screen, and no more than 30%, by weight, can be less than 6  $\mu\text{m}$ , effective diameter, which is measured using sedimentation techniques. The ground barite also must be dense enough that its specific gravity is 4.2 or greater, soft enough to not damage the bearings of a tricone drill bit, and both chemically inert and containing no more than 250 milligrams per kilogram (mg/kg) of soluble alkaline salts (American Petroleum Institute, 1993, p. 6-11). A small percentage of iron oxide is allowable.

An additional benefit of barite is noninterference with magnetic measurements taken in the borehole, either during logging-while-drilling or in separate drill-hole logging.

## Production

Barite production in 2003 was 468,000 metric tons (t), an 11% increase from that of 2002. Domestic production and sales data for barite were derived from voluntary responses to the U.S. Geological Survey (USGS) canvass of U.S. operations and followup telephone calls. All of the 32 known operations responded. Six mines were included in the survey; five were producing and one was idle. Of the producing mines, four were in Nevada, and one was in Georgia; the idle mine was in Tennessee, and two mines, one each in Georgia and Missouri, had been shut down at the end of 2002. There were 26 mills and grinding plants operating at the end of the reporting year. Three grinding plants in Nevada were associated with mines but were surveyed separately from the mines. The five active mines had associated grinding plants. Three mine and associated mill production lines were in Nevada, one mine and associated mill production line was in Georgia, and the P&S Mine in Nevada supplied a grinding plant in California. Some of the ore from Nevada was sent for grinding to the coast of the Gulf of Mexico. Most ore in Nevada was ground onsite or in California and sold either into the Northwestern United States and southwestern Canadian petroleum drilling markets or to local industrial users.

About 2.1 million metric tons (Mt) or about 94% of barite sales from domestic crushers and grinders sales was for petroleum-well-drilling API specification markets, and about 6% were for industrial end uses (table 3).

There were 16 facilities on the coast of the Gulf of Mexico that produced API-grade barite in 2003. In Louisiana, three grinding plants operated in the Amelia/Morgan City area, one in Houma, two near the Lake Charles/Westlake area, one in New Iberia, and one near New Orleans. In Texas, there were two grinding plants in Brownsville, three in Corpus Christi, one in Galveston, and two in Houston, one of which produced both API and industrial product. These stand-alone grinding plants received mostly relatively low-priced crude barite primarily from China and India for grinding to petroleum-well-drilling specifications.

The industrial-grade barite grinding plants are gathered along the banks of the Mississippi River to receive imported barite by barge and allow shipping the finished product by barge, if possible, or rail or truck, to industrial users in the Midwestern United States. These mills produced filler-and-extender- and chemical-grade barite for industry markets. There was a stand-alone mill in Georgia near the remaining mine and mill operation, two mills in Illinois, one mill in Missouri, and one mill near Dyersburg, TN. The formerly idled mines in Georgia and Missouri were shut down permanently at the end of 2002. After depleting the mine stock, the associated grinding plants began grinding imported crude barite.

A major U.S. barite company was Baker Hughes Inteq., a division of Baker Hughes, Inc. Another major U.S. barite company was Halliburton Energy Services, Inc. Baroid is a product and service line of Halliburton and was the Halliburton’s fluid and industrial barite subsidiary. In December 2003, CIMBAR Performance Minerals part of Baroid was sold to United Minerals & Properties, Inc. of Chatsworth, GA, and CIMBAR’s Cartersville, GA, and Missouri operations were included in the sale. Halliburton kept the Houston grinding plant for its oil-field grinding requirements. A third major U.S. barite company, formerly known as M-I Drilling Fluids, was a joint venture between Smith International Inc. and Schlumberger Ltd. In 2003, the joint venture changed its name to M-I SWACO to encompass all products and services. Baker Hughes Inteq., Halliburton, and M-I SWACO are world renowned and operate in many countries, mining barite and providing drilling sales and services. These three companies mined barite in Nevada with associated beneficiation plants (mills) and also operated grinding plants in Louisiana and Texas. Excalibur Minerals Inc. (a

division of Newpark Resources, Inc. of Houston) was a major barite importer and grinder in Louisiana and Texas. The company also operated an industrial barite plant in Tennessee. Newpark recently bought an Italian company to extend its presence into the Mediterranean Sea region. There were other, smaller companies near the Gulf of Mexico that received imported barite by ship through Louisiana and Texas ports. Ambar Drilling Fluids LP in Houma, LA, grinds barite for its service unit. U.S. Clay LP of Birmingham, grinds bentonite for itself in Brownsville, TX, and grinds crude barite for the other grinders [tolls] in the plant when the other grinders are short of grinding capacity. The other grinding plant in Brownsville is owned by Minerals y Arcillas S.A. de C.V. and is the Mexican portion of Milwhite Company. After grinding to API specifications, the barite is transferred directly to containers on barges docked in canals, lakes, and rivers near the plants for large-scale deliveries to the offshore drilling platforms. These near-shoreline barite staging locations also are closer to the clusters of onshore areas with significant petroleum production in the Petroleum Administration for Defense (PAD) District 3. The PAD districts were World War II divisions of the oil-producing areas of the United States; these designations continue to be used.

## Environment

In offshore drilling, the U.S. Environmental Protection Agency (EPA) has limited the content of mercury to 1 mg/kg of barite and that of cadmium to 3 mg/kg of barite (U.S. Environmental Protection Agency, 1997). Although barite contains a heavy metal (barium), it is not a toxic chemical under section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 because it is insoluble.

A newspaper report raised an issue of mercury introduced by barite through the activities of offshore drilling rig platforms in the Gulf of Mexico. "Information from the U.S. Department of the Interior's Minerals Management Service (MMS) studies was used to support the conclusion that drilling activities and platform structures were responsible for elevated levels of mercury in commercial fish. Additionally, the report stated that the issue has been 'largely overlooked by regulators.' However, the MMS study referenced was misrepresented, resulting in misleading and incorrect conclusions" (U.S. Department of the Interior, Minerals Management Service, 2002<sup>1</sup>). In actuality, the mercury found in barite is insoluble mercury sulfate, which is not available for conversion to methylmercury, and the MMS, the EPA, the National Academy of Sciences, State Governments, and industry have conducted laboratory and field studies for more than 20 years to ensure that mercury potentially associated with oil and gas operations have not been harming the environment.

## Consumption

Apparent consumption of domestic barite rose by about 8% to about 2.1 Mt in 2003 from about 1.9 Mt in 2002 (table 1). Ground barite sales rose by about 13% to more than 2.2 Mt in 2003 from about 2.0 Mt in 2002 (table 1). For 2003, sales by crusher and grinder operations in Louisiana was essentially unchanged at 1.1 Mt, while the sales of crushed and ground barite by crusher and grinder operations in Texas increased by more than 20% to 632,000 t from 526,000 t (table 2).

In 2003, sales of domestic and imported industrial barite increased by more than 25% to 129,000 t (table 3). The 25% increase in industrial sales of barite was probably the result of increased automobile sales. Barite-containing materials that are used for sound reduction in engine compartments are gaining market share among automotive manufacturers. Barite also is used in the base coat of automobile finishes for smoothness and corrosion resistance and continues to be used in friction products for automobiles and trucks.

Since 1998, consumption of barite in well drilling in the United States has been driven more by the demand for natural gas than for oil. In the United States, the drilling rig count has been more closely correlated to natural gas price trends through 2003 than to the price trends of oil (Oil and Gas Journal, 2003a, b; 2004 a, b). The percentage of drill rigs in the United States directed towards gas was more than 80% for all of 2003, with the percentage at 84% or more, for 8 nonconsecutive months of 2003, and at yearend, the percentage was 86%. The total count for gas drill rigs was about 718 at the beginning of the year and 956 near yearend (Oil and Gas Journal, 2004b).

The unweighted average price of natural gas in the United States increased in January 2003 to \$5.13 per million British thermal units from \$3.64 per million British thermal units in December 2002, using one price per month and no weighing by the amount of gas sold. The natural gas price reached an annual peak in March of about \$7.00 per million British thermal units. Natural gas prices slumped from about \$5.30 per million British thermal units to about \$4.74 per million British thermal units for the months of August, September, October, and November before rebounding to about \$5.80 per million British thermal units for December. It should be noted that even though the price trend line for the year had a negative slope, the gas directed drill rigs trend line had a positive slope. This would be interpreted as the price for natural gas was higher than a minimum profitable level for the whole year. Oil exploration and development companies were responding relatively quickly to oil price changes, while companies involved in gas exploration and development were ignoring future gas price trends. This could mean that a smaller group of smaller oil companies, who could respond more quickly to oil price changes, are now exploring and developing small oil fields, while the leading companies have largely left North America, other than the Gulf of Mexico. The domestic oil- and gas-directed total was about 850 drill rigs at the beginning of 2003 and finished at about 1,110 total drill rigs. Each month, there was a slight increase, or the rig count remained unchanged, except for a less than 1% dip in September. More drill rigs means greater barite consumption, and the sales for well

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<sup>1</sup>References that include a section mark (§) are found in the Internet References Cited section.

drilling barite increased by 12% to 2.1 Mt. It would also appear that the crushers and grinders had some stocks left over from the drill rig activity decline going into spring 2002 to be able to sell more barite in 2003 than was imported during 2003.

## Foreign trade

Barite exports during 2003 decreased by 6% to 44,400 t. Canada received 87% of the total, and Mexico received 12%. Another 13 countries received the remaining 1% with less than 85 t each. Imports of crude natural barite [Harmonized Tariff Schedule of the United States (HTS) code 2511.10.5000] came only from China, India, and Norway, along with a trial sample from Chile. About 1.62 Mt was received, up by more than 7% from 2002. Imports for the several forms of barite reported under the HTS nomenclature “Other sulfates of barite” rose by about 5% to 32,800 t. Crude natural barite imports (HTS 2511.10.5000) per half year were 894,000 t for the first half of the year and 725,000 t for the second half of the year. Crude natural barite imports through the New Orleans, LA, port were 1.18 Mt, while crude natural barite imports into Texas through Laredo and Houston-Galveston were 444,000 t.

## Prices

The average weighted sales value per ton for primary barite from mines and their associated beneficiation plants in the United States increased to \$29.70 per metric ton, about a 3% increase compared with that of 2002 (table 1). The average weighted sales value for crushed and ground barite for oil well drilling in Louisiana decreased to \$75.93 per ton or by about 1% compared with that of 2002, and the same category in Texas decreased to \$80.18 per ton or by about 5% compared with that of 2002 (table 2). The average weighted sales value of the production of the other States decreased to \$61.49, a 5% decrease compared with that of 2002. Barite for barium chemicals, filler and extender, and glass use increased by about 10% to about \$155 per ton for 2003 (table 3).

According to Industrial Minerals (2003), midyear international barite prices were as follows:

- API, lump, cost, insurance, and freight [U.S.] Gulf Coast, Chinese, \$43 to \$48 per ton; Indian, \$47 to \$49 per ton; Moroccan, \$50 to \$52 per ton.
- Ground, OCMA, bulk, delivered to Aberdeen (United Kingdom), \$82.51 to \$90.75 per ton<sup>2</sup> (£50 to £55 per ton).
- Micronized, off white minimum 99% less than 20 µm delivered to the United Kingdom, \$231.01 to \$247.52 per ton (£140 to £150 per ton).

## World Review

Worldwide consumption of barite outside of North America remained at about the same level as 2002. According to the world drill rig reports, which do not cover most of the Commonwealth of Independent States or China, the world drill rig count increased by about 19.3% to 2,176 rigs (averaged during the 12 months) count, from 1,823 in 2002, an average rig increase of 353 (Oil & Gas Journal, 2003c, 2004c). The growth in the counted drill rigs was mostly in Canada, Latin America, and the United States. The United States annual average drill rig count increased by 190 rigs and Canada’s average drill rig count increased by 108 rigs for a North American average total increase of 298 rigs. Latin America’s drill rig count averaged an increase of 31 drill rigs. Adding Latin America’s count to that of North America, the sum is an average increase of 329 rigs compared with 2002. The Asia Pacific region had an average rig count increase of more than 6 rigs, the African region’s average rig count decreased by an average of more than 3 rigs, Europe’s average rig count decreased by an average of less than 5 rigs, and the Middle East’s average rig count increased by an average of 10 rigs. The average of this group of four regions, two of which have been called “frontier” regions, is an average rig count increase of about 8 rigs compared with 2002. If Latin America’s average rig count change is not added to North America’s but instead added as a third “frontier” region to Asia Pacific, Africa, Europe, and Middle East, the increase was only 39 rigs.

## Outlook

It remains to be seen how much new or expanded reserves/resources of gas and oil will be brought to the market under profitable conditions to the explorers and developers in 2004 following the latest price increases and the ensuing drill rig count increase. Most of the drill rigs in 2003 in North America were directed toward gas and the trend is expected to continue. The price of barite appears to be relatively steady as consumption has slowly risen during the past several years. The price of barite is a rather small part of the total cost of gas and oil exploration and development. Still, the demand for barite in the United States is expected to increase. The John S. Herold snapshot (J.S. Herold, Inc., 2004§) shows that the worldwide reserve and replacement cost<sup>3</sup> is also rising in parallel with the U.S. cost, though not to the U.S. level. The higher inconvenience foreign gas shipping cost, lack of infrastructure in frontier regions, and inconvenience should protect domestic gas production and domestic barite usage in the near term. There may be more gas fields in the Gulf of Mexico, or elsewhere within North America, to find and develop. In the short term, barite consumption will stay relatively level since the first reports from J.S. Herold revealed that gas directed drilling in the United States has been profitable

<sup>2</sup>Where necessary, values have been converted from English pounds (£) to United States dollars (\$) at a rate of \$1.00=£0.6060 for June 30, 2003

<sup>3</sup>Reserve replacement costs (RRC) are calculated by taking total costs incurred (proved and unproved property acquisition costs, exploration costs, and development costs) during the applicable period as the numerator and of dividing by the total [barrel] oil equivalent (boe) reserve changes associated with extensions and discoveries, revisions in estimates, improved recovery, and purchases of proved reserves as the denominator. This statistic measures the per boe cost of adding reserves from all sources (Herold and Lovegrove, 2004, p. 24).

as indicated by a “reserve replacement cost” of \$9.26 per barrel of oil equivalent with a “recycle ratio”<sup>4</sup> of 231.2% (John S. Herold, Inc., 2004§). ExxonMobil Corporation (2004§) forecast the following: “In the coming decades, meeting the expected increase in global energy demand will require a broad portfolio of energy options, and hydrocarbon fuels are expected to remain the dominant energy source through at least the middle of the century.”

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<sup>4</sup>“The recycle ratio is the netback, which consists of revenues less production expenses, production taxes, and shipping and transportation expenses reported on a boe basis as the numerator and divided by RRC per boe. This statistic measures the cost of adding reserves from all sources in relation to its netback. Just because a company has a low reserve replacement cost, doesn’t necessarily mean the company is adding value to its upstream portfolio. A recycle ratio of 2 or higher is generally associated with upstream value creation [2 = 200%]” (Herold and Lovegrove, 2004, p. 24).

TABLE 1  
SALIENT BARITE STATISTICS<sup>1,2</sup>

(Thousand metric tons and thousand dollars)

	1999	2000	2001	2002	2003
United States:					
Barite, primary:					
Sold or used by producers:					
Quantity	434	392	400	420	468
Value	11,100	9,840	11,000	12,200	13,900
Exports:					
Quantity	22	36	45	47	44
Value	2,750	4,180	5,330	4,230	4,620
Imports for consumption: <sup>3</sup>					
Quantity	871	2,100	2,510	1,540	1,650
Value	59,000	108,000	125,000	81,300	85,500
Consumption, apparent <sup>4</sup>	1,280	2,460	2,870	1,920	2,080
Crushed and ground, sold or used by processors: <sup>5</sup>					
Quantity	1,370	2,100	2,670	1,980	2,230
Value	108,000	159,000	206,000	151,000	165,000
World, production	6,160	6,490 <sup>r</sup>	6,590 <sup>r</sup>	6,020 <sup>r</sup>	6,520 <sup>e</sup>

<sup>e</sup>Estimated. <sup>r</sup>Revised.

<sup>1</sup>Data are rounded to no more than three significant digits.

<sup>2</sup>Barium chemicals data withheld to avoid disclosing company proprietary data.

<sup>3</sup>Includes crude and ground.

<sup>4</sup>Sold or used plus imports minus exports.

<sup>5</sup>Includes imports.

TABLE 2  
CRUSHED AND GROUND BARITE SOLD OR USED BY PROCESSORS IN THE  
UNITED STATES, BY STATE<sup>1, 2</sup>

State	2002			2003		
	Number of plants	Quantity (thousand metric tons)	Value (thousands)	Number of plants	Quantity (thousand metric tons)	Value (thousands)
Louisiana	8	1,080	\$82,400	8	1,070	\$80,900
Texas	8	526	44,300	8	632	50,700
Other <sup>3</sup>	10	380	24,600	10	537	33,000
Total	26	1,980	151,000	26	2,230	165,000

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>Includes imports.

<sup>3</sup>Includes California, Georgia, Illinois, Missouri, Nevada, and Tennessee.

TABLE 3  
CRUSHED AND GROUND BARITE SOLD OR USED BY PROCESSORS IN THE  
UNITED STATES, BY USE<sup>1, 2</sup>

(Thousand metric tons and thousand dollars)

Use	2002		2003	
	Quantity	Value	Quantity	Value
Barium chemicals, filler and/or extender, glass	103	14,600	129	20,000
Well drilling	1,880	137,000	2,110	145,000
Total	1,980	151,000	2,230	165,000

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>Includes imports.

TABLE 4  
U.S. EXPORTS OF NATURAL BARIUM SULFATE (BARITE), BY COUNTRY<sup>1</sup>

Country	2002		2003	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Angola	45	\$11	--	--
Australia	37	50	--	--
Canada	44,600	3,250	38,600	\$3,480
Chad	185	138	--	--
China	32	27	--	--
Colombia	13	4	--	--
Costa Rica	39	9	--	--
Ecuador	18	3	4	20
El Salvador	--	--	3	7
Finland	62	23	--	--
France	6	4	17	8
Germany	16	32	--	--
Iceland	20	6	--	--
Japan	238	58	84	56
Korea, Republic of	5	3	7	9
Kuwait	--	--	40	8
Lebanon	--	--	42	21
Mexico	1,720	503	5,500	724
Norway	16	3	--	--
Philippines	--	--	14	20
Poland	32	15	--	--
Portugal	10	10	--	--
South Africa	--	--	16	248
Spain	--	--	1	3
Switzerland	3	15	--	--
Trinidad and Tobago	--	--	25	6
Turkey	4	31	--	--
United Kingdom	42	4	17	8
Venezuela	109	37	1	4
Total	47,200	4,230	44,400	4,620

-- Zero.

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

Source: U.S. Census Bureau.



TABLE 5  
U.S. IMPORTS FOR CONSUMPTION OF BARITE, BY COUNTRY<sup>1</sup>

Country	2002		2003	
	Quantity (metric tons)	Value <sup>2</sup> (thousands)	Quantity (metric tons)	Value <sup>2</sup> (thousands)
Barite, crude:				
Chile	--	--	100	\$3
China	1,380,000	\$57,000	1,530,000	64,200
India	77,000	3,570	87,100	3,910
Morocco	47,800	2,510	--	--
Norway	--	--	4,880	135
Total	1,510,000	63,100	1,620,000	68,200
Barite, ground:				
Canada	22	3	--	--
China	5,150	591	--	--
Hong Kong	--	--	40	4
Mexico	--	--	134	10
Total	5,170	594	174	15
Barite, other sulfates of:				
Australia	6	32	1	6
Belgium	82	158	--	--
Canada	552	542	406	366
China	14,700	3,150	16,300	3,550
France	59	39	--	--
Germany	10,000	9,410	11,000	9,900
Italy	4,180	2,330	4,180	2,260
Japan	992	1,410	579	919
Mexico	23	8	--	--
Netherlands	--	--	39	42
Russia	91	29	--	--
Spain	172	122	220	196
Switzerland	315	439	20	28
Total	31,200	17,700	32,800	17,300

-- Zero.

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>Cost, insurance, and freight value.

Source: U.S. Census Bureau, as adjusted by the U.S. Geological Survey.

TABLE 6  
U.S. IMPORTS FOR CONSUMPTION OF BARIUM CHEMICALS<sup>1</sup>

	2002		2003	
	Quantity (metric tons)	Value <sup>2</sup> (thousands)	Quantity (metric tons)	Value <sup>2</sup> (thousands)
Barium chloride	244	\$122	270	\$150
Barium oxide, hydroxide, peroxide	4,710	4,040	3,560	3,260
Barium nitrate	7,470	6,830	4,620	7,740
Barium carbonate, precipitated	18,400	6,030	9,810	4,860

<sup>1</sup>Data are rounded to no more than three significant digits.

<sup>2</sup>Cost, insurance, and freight value.

Source: U.S. Census Bureau.

TABLE 7  
BARITE: WORLD PRODUCTION, BY COUNTRY<sup>1,2</sup>

(Metric tons)

Country	1999	2000	2001	2002	2003 <sup>e</sup>
Afghanistan <sup>e,3</sup>	2,000	2,000	2,000	2,000	2,000
Algeria	50,150	51,925	43,020 <sup>r</sup>	51,733 <sup>r</sup>	49,995 <sup>4</sup>
Argentina	4,365	5,472 <sup>r</sup>	6,955 <sup>r</sup>	3,048 <sup>r</sup>	3,261 <sup>p</sup>
Australia <sup>e</sup>	18,000	20,000	20,000	-- <sup>r</sup>	20,000
Belgium <sup>e</sup>	30,000	30,000	30,000	30,000	30,000
Bolivia	6,005	3,050	6,253	1,556 <sup>r</sup>	2,000
Bosnia and Herzegovina <sup>e,5</sup>	2,000	2,000	2,000	2,000	1,851 <sup>4</sup>
Brazil, beneficiated	44,906	53,741	54,790 <sup>r</sup>	54,895 <sup>r</sup>	55,000
Bulgaria <sup>e,6</sup>	120,000	120,000	100,000	90,000	75,000
Burma	24,651	30,370	-- <sup>r</sup>	18,000 <sup>r</sup>	20,000
Canada	123,000	67,000	23,000	19,000 <sup>r</sup>	23,000
Chile	823	1,026	584	384 <sup>r</sup>	390
China <sup>e</sup>	3,500,000	3,500,000	3,600,000	3,100,000	3,500,000
Colombia <sup>e</sup>	600	600	600	600	600
Egypt <sup>e</sup>	300	500	500	500	500
France	75,000	75,000	75,000 <sup>e</sup>	75,000 <sup>e</sup>	75,000
Georgia <sup>e</sup>	15,000	15,000	15,000	15,000	15,000
Germany, marketable Ba <sub>2</sub> SO <sub>4</sub> <sup>e</sup>	120,000 <sup>4</sup>	120,000	120,000	120,000	120,000
Greece, crude ore <sup>e</sup>	800	800	800	800	800
Guatemala <sup>e</sup>	75	113	100	100	90
India	360,000 <sup>e</sup>	840,000	850,000 <sup>e</sup>	600,000 <sup>e</sup>	700,000
Iran <sup>3</sup>	183,850	185,000 <sup>e</sup>	195,539 <sup>r</sup>	179,652 <sup>r</sup>	150,000
Italy <sup>e</sup>	25,000	25,000	25,000	25,000	25,000
Kazakhstan <sup>5</sup>	13,300	14,000 <sup>e</sup>	45,000	46,000 <sup>r</sup>	40,000
Korea, North <sup>e</sup>	70,000	70,000	70,000	70,000	70,000
Korea, Republic of	--	30	--	--	--
Laos	6,600 <sup>r</sup>	2,000	1,700	2,000	2,000
Malaysia	13,506	7,274	649	3,082 <sup>r</sup>	300
Mexico	157,953	127,420	142,017 <sup>r</sup>	163,620 <sup>r</sup>	255,961 <sup>p</sup>
Morocco	328,945	343,557 <sup>r</sup>	471,102 <sup>r</sup>	469,934 <sup>r</sup>	356,394 <sup>4</sup>
Nigeria <sup>e,7</sup>	5,000	5,000	5,000	5,000	5,000
Pakistan	20,505	21,234	22,000 <sup>e</sup>	25,000 <sup>e</sup>	25,000
Peru	3,512	11,403	11,031	3,806 <sup>r</sup>	2,906 <sup>4</sup>
Poland	500	2,000	2,500	2,700	3,000
Romania, processed	4,641	4,266	2,849	100 <sup>r</sup>	2,000
Russia <sup>e</sup>	60,000	60,000	60,000	60,000	60,000
Saudi Arabia <sup>e</sup>	7,000	8,000	9,000	9,000	9,000
Slovakia, concentrate	16,000	14,000	14,000	11,000 <sup>r</sup>	14,000
South Africa	2,844	1,628	-- <sup>e</sup>	-- <sup>e</sup>	--
Spain, marketable Ba <sub>2</sub> SO <sub>4</sub>	26,000	26,000	26,000 <sup>e</sup>	26,000	26,000
Thailand	76,092	56,180	23,559	137,469 <sup>r</sup>	130,000
Tunisia	530	3,702	2,208	5,539	5,000
Turkey, run of mine	150,058	120,893	53,373 <sup>r</sup>	106,843 <sup>r</sup>	110,000
United Kingdom	59,000	55,000	60,000 <sup>e</sup>	60,000 <sup>e</sup>	60,000
United States <sup>8</sup>	434,000	392,000	400,000 <sup>e</sup>	420,000	468,000 <sup>4</sup>
Total	6,160,000	6,490,000 <sup>r</sup>	6,590,000 <sup>r</sup>	6,020,000 <sup>r</sup>	6,520,000

<sup>e</sup>Estimated. <sup>p</sup>Preliminary. <sup>r</sup>Revised. -- Zero.

<sup>1</sup>World totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>Table includes data available through June 10, 2004.

<sup>3</sup>Data are for fiscal year beginning March 21 of that stated.

<sup>4</sup>Reported figure.

<sup>5</sup>Based on an estimated 70% recovery factor.

<sup>6</sup>Barite concentrates.

<sup>7</sup>Considerably more barite is produced, but its considered to be commercially unusable.

<sup>8</sup>Sold or used by producers.